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Army Reserve Component Accessions from Personnel Completing Their First Active-Duty Enlistment

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Arroyo Center

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Preface

This study describes the results of an analysis of the rate at which individuals who have completed an active-duty enlistment tour in the Army join the Army reserve components. This prior-service enlistment pool provides about 50 percent of all accessions for the Army reserve components. These prior-service soldiers provide the reserves with a critical source of experienced, trained soldiers who can immediately enhance the readiness of the selected reserves at minimal cost. The analysis is part of the Arroyo Center's Manpower and Training program.

The Army Fellows Program

Stephen Kirin, a lieutenant colonel in the U.S. Army, participated in this research as part of RAND's Army Fellows Program. The U.S. Army established the program in 1985. The purpose of the program is to allow Army officers to broaden their perception of Army policy and technology issues by exposure to diverse attitudes and perspectives embodied in the RAND staff. Furthermore, the program supports Army Fellows in learning advanced analytical techniques to study policy and acquisition issues.

Several branch-qualified officers are board-selected annually to conduct one year of research at RAND's Arroyo Center. The officers are selected for their strong analytical skills, academic ability, service experience, and demonstrated career potential to assume Army command and senior staff assignments.

The Arroyo Center

The Arroyo Center is the U.S. Army's federally funded research and development center (FFRDC) for studies and analysis operated by RAND. The Arroyo Center provides the Army with objective, independent analytic research on major policy and organizational concerns, emphasizing mid- and long-term problems. Its research is carried out in four programs: Strategy and Doctrine, Force Development and Technology, Military Logistics, and Manpower and Training.

Army Regulation 5-21 contains basic policy for the conduct of the Arroyo Center. The Army provides continuing guidance and oversight through the Arroyo Center Policy Committee (ACPC), which is co-chaired by the Vice Chief of Staff and by the Assistant Secretary for Research, Development, and Acquisition. Arroyo Center work is performed under contract MDA903-91-C-0006.

The Arroyo Center is housed in RAND's Army Research Division. RAND is a private, nonprofit institution that conducts analytic research on a wide range of public policy matters affecting the nation's security and welfare.

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Contents

Figures

Tables

Summary

Background

The planned reduction in force and restructuring of the Army active component (AC) will substantially affect the manning of the Army reserve components (RC). Historically, about 40 percent of the Army National Guard (ARNG) and 60 percent of the United States Army Reserve (USAR) soldiers have served an active-duty tour of service (Buddin and Grissmer, forthcoming). These prior-service soldiers provide the RC with a critical source of experienced, trained soldiers who can immediately enhance the readiness of the Selected Reserve at minimal cost.

While the ultimate size and structure of the RC is uncertain, the planned changes in the AC will substantially alter the flow of trained personnel into the RC. In the short term, AC force reductions will increase the potential supply of those with prior service to the reserves. However, these "laid off" soldiers might be reluctant to affiliate with a reserve unit because their AC service was unexpectedly cut short. In addition, most senior personnel departing from the AC are unlikely to join the RC because historically the reserves have had few unfilled positions in the senior ranks. Finally, the recent Desert Storm experience could make reserve service less attractive for personnel who may foresee the potential for future call-ups that might adversely affect their civilian employment or family situation.

In the longer term, the smaller AC will provide a reduced pool of soldiers available to the RC. The occupational structure of the AC may also change in the restructured force, so that the RC may find substantial mismatches in the supply and demand of appropriately trained prior-service personnel. For these reasons, if the reserve components remain large, over the long term they will need to substantially increase the reserve affiliation rate of soldiers who separate from the AC or reduce their reliance on soldiers with prior active-duty training.

Research Focus

This research provides insights into how changes in the AC are likely to affect RC manning. The goal is to provide a historical baseline to anticipate changes in prior-service supply that could arise from the above sources. We examine

available empirical evidence to define an expected baseline transition rate and to understand how that rate is influenced by variation in the gender, quality, race/ethnicity, or occupational composition of the soldiers departing the AC.

An additional focus of this study is differences in transition rates into the RC by the length of initial active-duty term. The study complements previous analysis of the 2+2+4 recruiting experiment (Buddin, 1991) by providing evidence on the likely RC benefits of the enlistment program. Under the 2+2+4 program, recruits were offered a two-year active-duty tour in selected noncombat occupational specialties, with an additional commitment of two years in the Selected Reserve and approximately four years in the Individual Ready Reserve (IRR). The experimental program was offered from July 1989 through September 1990. The reserve implications of the 2+2+4 program will not be known until 1993 or later, when program participants complete their active-duty obligation and make the transition into the Selected Reserve. This study, however, provides historical evidence on the transition rates of two-year recruits into the RC as compared with those rates for three- and four-year enlistees.

Previous RAND reserve research lays the groundwork for the analysis reported here. In Marquis and Kirby (1989), the authors were unable to distinguish between prior service in the AC and prior RC experience. The study investigated the impact of demographic characteristics and economic factors on the transition flow from AC to RC, the pattern and timing of entrance into the RC, and the match between a soldier's AC and RC skill.

This effort will address similar issues; however, our focus is narrower. Rather than examine the transition flow of all soldiers from both the AC and RC into the Selected Reserve, we will concentrate only on those soldiers departing the AC. Whereas the previous effort examined soldiers with varying years of service, we concentrate exclusively on active-duty enlisted soldiers who terminate service upon completion of their initial term of enlistment. This group constitutes the primary pool of active-duty soldiers available to the RC.

Results

The analysis shows that about 40 percent of the Army's first-term soldiers who do not reenlist at the end of their first term join the Army's reserve components. About a fifth of each exit cohort makes an immediate commitment to join a reserve unit before returning home. Individuals with an interest in the RC are likely to join the RC quickly after leaving the AC. The cumulative reserve affiliation rate is 30 percent after six months and 32 percent after one year. The

risk or hazard of joining continues to decline thereafter, but some prior-service soldiers are still joining RC units two and three years after leaving the AC. The cumulative reserve affiliation rate is 36 percent after two years and 39 percent after three years.

The study uses two statistical approaches to examine reserve participation rates. Both approaches are designed to adjust for a censored data problem that occurs because some of the individuals in our database have been "at risk" to join the RC for a longer period than have others. A Kaplan-Meier approach is used to describe broad patterns in the timing of RC participation after separating from the AC. A Cox proportional hazards model is also estimated to simultaneously sort out the effects of a variety of individual characteristics and occupational factors on RC participation.

The results show that RC participation varies substantially by AC term of enlistment. Initial tabular analysis and Kaplan-Meier results showed that four-year enlistees had much lower participation rates than three- and two-year enlistees. The more refined multivariate estimates showed that the differences in participation rates between three- and four-year enlistees are modest after controlling for other factors, but two-year enlistees have much higher participation rates than the other groups. Other things equal, the RC participation rate for two-, three-, and four-year enlistees are predicted to be 49, 34, and 30 percent, respectively. This large effect of shorter term on RC manning persists even after controlling for individual age, aptitude, and occupational training. The finding suggests that shorter terms might ease RC manning problems by cycling people quickly through the AC and because these recruits are more disposed to joining the RC.

The study also found substantial differences in RC participation by race/ethnicity, aptitude, and age group. Other things equal, blacks and Hispanics are 44 and 26 percent more likely to participate in the RC than white non-Hispanics. Individuals in Armed Forces Qualification Test (AFQT) Category IV are about 30 percent more likely to join the reserve than their counterparts in higher aptitude groups. The race/ethnic and aptitude effects may reflect either limited civilian employment opportunities for these groups or a greater taste of these groups for RC service. RC participation declined monotonically with recruit age at active-duty accession, and the predicted RC affiliation rate for a 23-year-old was about 7 percentage points lower than for a comparable 18-year-old. These age differences in participation reflect different life-cycle behaviors, where younger individuals have fewer family responsibilities to conflict with reserve participation. Also, we suspect that school enrollment declines rapidly with age

and that reserve participation is more complementary with school enrollment than with full-time employment.

RC participation differs markedly by occupational groups, but these differences probably reflect a combination of supply and demand factors. Some areas like combat and communications/intelligence are disproportionately concentrated in the AC, while other areas like medical/dental, functional support/administration, and craftsmen are disproportionately concentrated in the RC. Reserve units should prefer prior-service personnel trained in skills needed by the unit, but it is unclear whether mismatched prior-service personnel were discouraged from joining the RC. Also, some individuals may prefer to retrain out of their active-duty skill and affiliate only if reassignment is available.

Several factors have small effects on RC participation. Affiliation does not differ by educational level and is only about 3 percentage points higher for males than for females. Higher wage rates and lower unemployment rates discourage reserve participation but the economic variables have a weak effect on RC participation.

Finally, the high affiliation rate of two-year enlistees suggests that the 2+2+4 program should provide a substantial benefit to the RC. The 2+2+4 program makes reserve participation a condition for the receipt of Army College Funds, so the affiliation rate of program participants should be even higher than for other two-year enlistees. Further analysis of the 2+2+4 cohort will provide an opportunity to identify whether post-service school enrollment is the pivotal factor in the higher affiliation rates of individuals with short tours.

1. Introduction

Background

The planned reduction in force and restructuring of the Army active component (AC) will substantially affect the manning of the Army reserve components (RC). Historically, about 40 percent of the Army National Guard (ARNG) and 60 percent of the United States Army Reserve (USAR) soldiers have served an active-duty tour of service (Buddin and Grissmer, forthcoming). These prior-service soldiers provide the RC with a critical source of experienced, trained soldiers who can immediately enhance the readiness of the Selected Reserve at minimal cost.

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In the longer term, the smaller AC will provide a reduced pool of soldiers available to the RC. The occupational structure of the AC may also change in the restructured force, so that the RC may find substantial mismatches in the supply and demand of appropriately trained prior-service personnel. For these reasons, if the reserve components remain large, over the long term they will need to substantially increase the reserve affiliation rate of soldiers who separate from the AC or reduce their reliance on soldiers with prior active-duty training.

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understand how that rate is influenced by variation in the gender, quality, race/ethnicity, or occupational composition of the soldiers departing the AC.

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Previous RAND reserve research lays the groundwork for the analysis reported here. In a previous RAND report (Marquis and Kirby, 1989), the authors were unable to distinguish between prior service in the AC and prior RC experience. That study investigated the impact of demographic characteristics and economic factors on the transition flow from AC to RC, the pattern and timing of entrance into the RC, and the match between a soldier's AC and RC skill.

This effort will address similar issues; however, our focus is narrower. Rather than examine the transition flow of all soldiers from both the AC and RC into the Selected Reserve, we will concentrate only on those soldiers departing the AC. Whereas the previous effort examined soldiers with varying years of service, we concentrate exclusively on active-duty enlisted soldiers who terminate service upon completion of their initial term of enlistment. This group constitutes the primary pool of active-duty soldiers available to the RC.

Our focus is motivated by several considerations. First, the U.S. Army Posture Statement for FY92/93 states that "as soldiers leave the Active Army, our goal is to place about one-third of the eligible specialists, corporals and sergeants into Reserve Component units based on the quality of the soldiers and their specialty skill qualifications." It is especially appropriate, therefore, to provide some insight into how well the Army has managed to achieve this objective in previous years, with a particular emphasis on the transition rate and occupational skill match of first-term soldiers. Second, several enlistment incentives either under consideration or actually being tested expect the soldier to join a Selected Reserve unit upon completion of the initial term of service (Buddin, 1991). Certainly, the

effectiveness of those programs will be better understood if historical baseline rates are defined. Finally, we will examine whether the proportion of prior active service soldiers entering the RC varies with the length of their initial term of service.

Similar to the previous report (Marquis and Kirby, 1989), our data allow us to examine these issues for both the United States Army Reserve and the Army National Guard. Our database consists of AC Army accessions from FY82 through FY84 who begin to leave the AC in FY84. This is a natural extension of the previous research which examined those departing the AC or RC during FY79 through FY84. Finally, for each issue, we will compare the results with those reported in the previous RAND effort, thus reinforcing the complementary nature of the documents.

Structure of the Report

Section 2 describes our data sources and the characteristics of those who entered the AC during the cohort years under investigation. It also presents the status of these same AC entrants as of 30 September 1988, the point at which they become candidates for our study.

Section 3 examines the demographic characteristics of that subset of AC soldiers who are RC accessions. The section also describes how RC affiliation rates vary with individual characteristics such as AC occupation or term of enlistment.

Section 4 develops and estimates a detailed model of AC/RC transitions. The statistical approach adjusts for a censoring problem in observed AC/RC transitions. Many soldiers leaving the AC may ultimately join the RC but may not yet have affiliated at the end of our observation period. This issue is particularly important for examining the effects of term of service on RC affiliation because the follow-up period for joining the RC is shorter for four-year enlistees than for two-year enlistees.

The statistical model relies on a multivariate approach to disentangle the effects of alternative individual characteristics. We might find, for example, that recruits with short enlistment terms have high RC affiliation rates. The statistical methodology will allow us to to determine whether term length is the salient factor in the higher affiliation rate or whether recruits with shorter terms have other characteristics or occupational training that would otherwise make them predisposed to joining the RC in higher numbers.

The last section summarizes our findings and offers conclusions.

2. Data Supporting the Analysis

Introduction

The primary data sources for this analysis are the quarterly personnel snapshots maintained by the Defense Manpower Data Center for active-duty and reserve personnel. Our reserve database contained information on reserve gains through the end of FY89. We concentrated on active-duty transitions to the reserves from the cohorts who joined the AC as nonprior-service accessions between FY82 through FY84. Depending on their term of enlistment, soldiers from these cohorts were completing their active-duty obligation in FY84 through FY88. The soldiers were tracked to determine whether they subsequently volunteered for service in a Selected Reserve unit.

This section describes the active-duty and reserve databases that were used in the analysis. We also present certain demographic characteristics of those soldiers who are identified as gains to the active Army for the cohort years under study and we identify the status of those gains as of the final day of FY89.

The Active-Duty Military Master and Loss Edit File

The Active-Duty Military Master and Loss Edit File provides a record of those enlisted soldiers who entered the active component during FY82 through FY84. For each entry, the data set identifies the soldier's date of entry, date of separation, reason for separation, character of service, the initial term of enlistment, bonus and enlistment options, occupational area, and length of service. The data set also contains certain demographic data about each soldier at the time of entry and departure including age, race/ethnicity, sex, marital status, and home of record. Finally, the data also identify the aptitude of the soldier as measured by Armed Forces Qualification Test (AFQT) scores, Armed Services Vocational Aptitude Battery (ASVAB) scores, and civilian educational level.

Table 2.1 depicts the demographic characteristics of the soldiers in this data set. As indicated in the table, the total number of enlisted entrants to active duty is 382,307. Nearly 90 percent of these accessions possess a high school diploma. The race/ethnicity composition is stable across cohorts with non-white soldiers comprising approximately 30 percent of the sample. The table also shows that

Table 2.1

Demographic Composition of Gains to the Active Army, FY82–FY84
(in percent)

Variable	FY82	FY83	FY84
Population	118,202	132,168	131,937
AFQT score			
Category I	4.6	5.3	5.2
Category II	24.1	27.5	27.8
Category III	48.8	52.4	53.8
Category IV	22.4	14.8	13.1
Education			
Less than high school	13.4	12.3	9.3
High school diploma	77.9	77.6	80.5
Some college or more	8.7	10.0	10.2
Sex			
Male	87.4	87.5	86.9
Female	12.6	12.5	13.1
Ethnic group			
White	68.3	71.7	70.7
Black	24.5	21.9	22.6
Hispanic	7.2	6.3	6.7
Term of enlistment			
2 year	5.9	6.9	7.8
3 year	56.7	58.5	57.9
4 year	37.3	34.6	34.2
DoD primary occupation			
Infantry & gun crew	27.7	24.7	26.2
Electronic equipment	4.2	3.2	3.3
Communications/intelligence	12.7	12.0	12.9
Medical/dental	5.0	4.6	4.7
Other technical/allied	2.1	2.1	1.9
Functional support/ administration	12.8	12.9	10.5
Electrical/mechanical	13.5	13.8	14.8
Craftsmen	1.6	1.9	2.2
Service/supply handlers	11.7	12.6	13.8
Non-occupational[a]	8.3	11.5	9.5

[a]Patients, prisoners, students, and trainees are not occupationally classified. Soldiers who separate during training are classified as "non-occupational" because they have not acquired a primary occupational specialty.

approximately 25 percent of the sample are in infantry and gun crew combat occupations.

Several differences are notable between these historical cohorts and those cohorts currently entering active duty. First, even though FY82 has markedly fewer accessions than did the other two years under study, the number of accessions in all three years significantly exceeds the number of annual gains programmed under all proposed draw-down scenarios. Second, the majority of soldiers enlisting during these cohorts assumed a three-year term of enlistment.

Currently, most soldiers entering active duty enlist for a four-year term of service. Finally, the soldiers in the cohort years under study incurred a six-year Military Service Obligation (MSO) upon enlistment, whereas now all soldiers incur an eight-year MSO. It is interesting to note that all soldiers who have not completed their MSO on active duty will, upon expiration of term of service (ETS), be transferred to the IRR unless they have "no potential for useful service under conditions of full mobilization."

Table 2.2 captures the current status of these entrants as of the final day of FY89, the effective date of the data set. As the table indicates, approximately 20 percent remain on active duty as of that date, while the remaining 80 percent have been released, discharged, or separated from enlisted service for a variety of reasons. Approximately one-half of the soldiers no longer on active duty are discharged upon honorable completion of their contractual term of service, although FY84 contains an unexplained high number of "early releases." Based on the length of the MSO, it is assumed that these soldiers were transferred to the IRR. The remaining soldiers are separated for a variety of reasons, and entry-level performance discharges and medical disqualifications clearly account for the largest percentage of these administrative discharges and separations.

We choose as our observed sample set those soldiers who are released from active service, either under an early release program or upon expiration of term of service. This includes approximately 41 percent of the original pool of entrants for a total observed sample of 155,587 individuals and accounts for 90 percent of the individuals in the original pool who enter the RC. This sample represents those soldiers who are fully qualified for reenlistment but chose not to exercise that option upon ETS or who are not authorized reenlistment under an enlisted year group management plan or strength management program. We exclude the remaining number of discharged or separated soldiers for a variety of reasons, including:

- These categories may imply that the soldier is no longer fully qualified for reenlistment and must submit a waiver in conjunction with his application for reserve duty. As indicated in AR 601–210, *Regular Army and Army Reserve Enlistment Program*, "the burden is on the applicant to prove to waiver authorities that they have overcome their disqualifications for enlistment." Waiver authorities range from the local recruiting battalion commander to the commanding general of the Army Reserve Personnel Center (ARPERCEN) and it is impossible, from the data, to gauge the subjective standards imposed in the preparation and approval of those waivers.

Table 2.2

Losses by Type and Cohort, FY82–FY84
(in percent as of 30 September 89)

Reason for Separation	FY82	FY83	FY84
Still on active duty	19.5	18.9	21.7
Released from active service			
Expiration of term of service	38.0	33.5	24.1
Early release	1.8	7.8	16.9
Medical disqualification			
Medically disabled	5.3	5.9	6.3
Failure to meet weight standard	0.4	0.4	0.5
Dependency or hardship	1.0	1.0	1.0
Death	0.3	0.3	0.3
Entry into officer program	1.2	1.2	1.2
Retirement	0.0	0.0	0.0
Behavioral/performance problem			
Alcohol or drug related	4.1	3.7	3.8
Entry-level performance[a]	16.5	15.0	12.0
Unsuitability[b]	1.3	0.7	0.8
Misconduct[c]	2.4	2.9	3.6
Other	5.4	5.1	4.7
Other separations			
Pregnancy	1.4	1.3	1.4
Parenthood	0.5	0.5	0.4
Other	0.3	0.4	0.4
Transactions			
Immediate reenlistment	0.0	0.7	0.0
Dropped from rolls	0.2	0.2	0.3

[a]Entry-level performance includes trainee discharge and expeditious discharge.

[b]Unsuitability includes discharges for character or behavior disorders, motivational problems, enuresis, inaptitude, shirking, unsanitary habits, and those coded unfit/unsuitable for unknown reasons.

[c]Misconduct includes discreditable incidents, civil court conviction, court-martial, AWOL or desertion, juvenile offender, misconduct for unknown reasons, pattern of minor disciplinary infractions, and commission of a serious offense.

- The data do not identify the degree of the condition causing the discharge. For example, a medically disqualified soldier can submit a waiver for reserve service if proof is available that the disqualifying medical condition no longer exists. We cannot discriminate, based on the data, those soldiers who may eventually become potential candidates for reserve service from those who will never overcome the disqualifying medical condition.

- In many instances, those soldiers who receive a waiver for the disqualifying condition must satisfy certain time constraints before they are allowed to reenter the service. For example, an individual confined as an adult offender for 15 days must wait three months after completion of that sentence before a waiver for enlistment may be submitted. Soldiers with lost time or absent without leave (AWOL) time must wait two years since the last day of lost

time to file a waiver for enlistment. These waiting times are not captured in the data and might influence the analysis.

- In certain categories, the individuals remain fully qualified for reserve service, although other conditions may exist that are not quantifiable in the data. For example, a soldier voluntarily discharged due to pregnancy is fully qualified for enlistment, and the data indicate that approximately 25 percent of those discharged under these conditions do, in fact, reenter military service in the reserve component. However, the data do not allow us to measure the effect of having a child and the impact of that responsibility on the decision to reenter military service.

A detailed listing of the categories, including the number of soldiers who are discharged or separated in each category, is shown in the Appendix. That listing also indicates, for each category, the number of soldiers who eventually join the Selected Reserve in both the USAR and ARNG.[1]

The Reserve Component Common Personnel Data System

The second data set is a derivative of the Reserve Component Common Personnel Data System (RCCPDS) and contains selected information about those individuals who enter the reserve components. Of particular importance to this effort, these files contain the soldier's date of entry into the reserve component, the soldier's reserve and training category, and his duty and primary Military Occupational Specialty (MOS). In addition, much of the same demographic data found in the first data set are also linked to each observation in these files. These files capture information on those soldiers who entered the reserve components during FY82 through FY88.

The active-duty loss records were matched by social security number to the reserve component gain files. If a match was found, information from the gain record was appended to the loss record, particularly the date of entry into the reserve component, the reserve component, category and training category, the unit identification code for Selected Reserve unit, and the reserve service primary and duty occupation. In addition, a "type-gain" code, designed to identify the

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[1]Tables A.1–A.3 show some RC accessions from virtually all attrition categories. For example, a small share of individuals who leave the active component with a "permanant disability" are later admitted to the reserve components. Even more surprising, about 1 percent of the soldiers who are listed as "non-battle deaths" will subsequently affiliate with a reserve component unit. Apparently, the coding of active-duty attrition reasons is not completely accurate, so it is impossible to fully ascertain the ability of these individuals to join the reserves.

manner of entry into the reserve component, was also added to the file. This code, for example, identifies whether the soldier entered the reserve component directly from the active component, if he was a transfer from the Individual Ready Reserve or Inactive National Guard (ING) or if he was entering from civilian life, having no contractual obligation to the military. This code supports detailed analysis of the break time between active and reserve component service and is examined in greater detail in Section 3.

As a result of this matching routine, we identify 51,201 soldiers who join the Selected Reserve from our observed sample of 155,587 individuals for an overall reserve accession rate of approximately 33 percent. This rate is in agreement with the earlier RAND research that found that "over a third of all losses from the Active Army eventually join the reserves." It also agrees with the published Army goal of placing one-third of the eligible specialists, corporals, and sergeants who leave the active component into RC units.[2]

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[2]Our statistical analysis below suggests that about 40 percent of the departing first-term AC personnel in our study will ultimately join the RC. This percentage is higher than the 33 percent that have already joined the RC, because we anticipate that many recent AC separatees will eventually join the RC. The earlier RAND study did not concentrate on first-term personnel, so the slightly lower affiliation rate may reflect lower RC affiliation rates by more senior AC personnel.

3. Characteristics of RC Entrants

Introduction

This section identifies the number of AC departees who join the RC and describes that transition flow in terms of gender, race/ethnicity, quality, and occupation.[1] The section describes the patterns of RC accession from first-term active-duty separatees. A more detailed statistical analysis of RC affiliation follows in Section 4.

Several additional screens must be applied to the observed sample of matching soldiers. First, those soldiers with other than a two-, three-, or four-year term of enlistment are excluded from the sample. This eliminates 43 soldiers who are coded as having enlisted for one-, five-, or six-year terms. Second, those soldiers who extend on active duty or who reenlist and still terminate their service within our study window are excluded. We include only those soldiers whose total active federal service is equal to their term of enlistment or those soldiers who depart service prior to completion of their first term. We intend to exclude those soldiers who, for example, enlist for a two-year term but, because of a voluntary extension, actually serve a three-year enlistment. Such individuals pose a definitional problem and could be counted in either the two- or three-year term category. A total of 25,578 soldiers are identified as serving extended tours and are eliminated.

We recognize the effect of the arbitrary truncation date imposed by the second data set. This censoring effect creates five categories of soldiers in our data, as depicted in Figure 3.1.

The type A soldier terminates active service, completes the remaining portion of the MSO in the IRR, and never volunteers for service in the Selected Reserve. The type B candidate completes active service and, at some point following ETS, joins a unit in the Selected Reserve. That point of entry into the RC can occur at

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[1] Other variables in the data set do suggest alternative analytical strategies. Unfortunately, the coding of those variables minimizes their utility. For example, 93 percent of the sample are coded as "unknown" for the variable that identifies the type bonus received upon enlistment. The educational bonus option also offers little opportunity for comparative analysis since, for example, 91.6 percent of the sample who enlist for a two-year term are coded as receiving the "two-year with $2000 and loan forgiveness" option. Some variance does exist in the enlistment option field between station of choice, training of choice, and unit of choice. Not surprisingly, however, 94.1 percent of the two-year enlistees enter under the "two-year option."
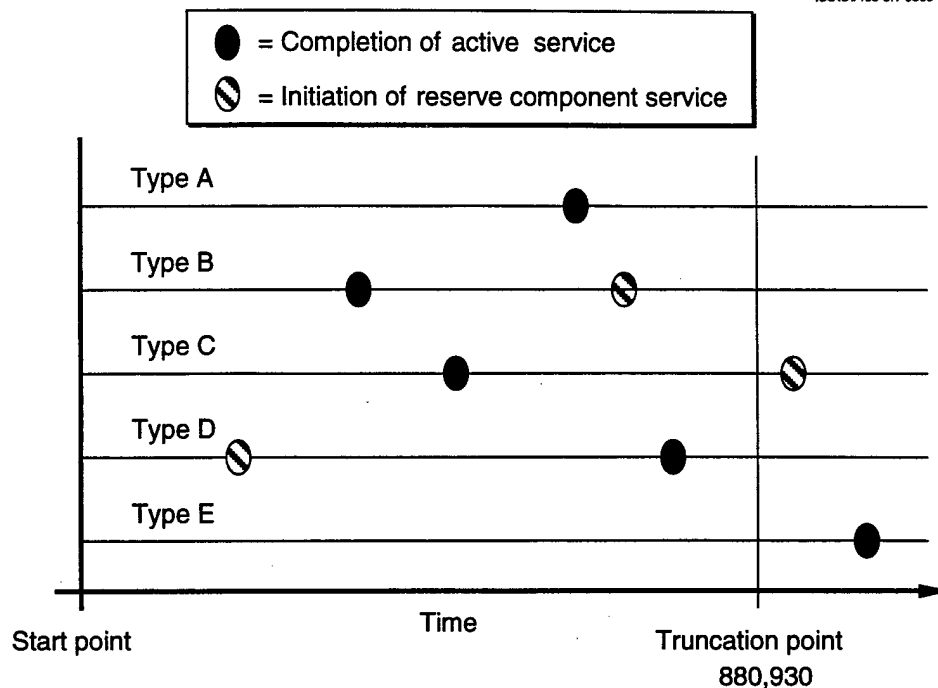
Figure 3.1—Types of Soldiers Found in Match Sample

any time and we will attempt to measure the mean length of that time for soldiers with various characteristics. The type C individual is similar to the type B soldier, except that this soldier's RC entry point falls beyond the arbitrary truncation point and we have no evidence of when that occurs. Since those soldiers who wait longer to join the RC are more likely to be found in this group, we cannot ignore their contribution to the analysis. Survival analysis techniques will be employed to account for this censoring effect.

In principle, our database consists of nonprior-service entrants to the active Army, but the database included a few individuals with some short reserve experience before joining the AC. These type D soldiers actually join the RC before enlistment in the AC. We excluded these individuals from our analysis, because we suspected that their subsequent RC affiliation patterns might be unrepresentative. Finally, the type E soldier remains on active duty throughout our study window and does not reach ETS prior to the arbitrary truncation point. For example, a soldier who joins the active component in FY84 for a four-year term may not complete the term of service until after the truncation point.

Type A, B, and C soldiers must remain in the sample. Type D soldiers could bias our analysis of expected transition time between AC and RC duty and must be excluded. There are 857 such soldiers in our data. Type E soldiers provide no

additional information and are also eliminated. We identify 13,729 type E soldiers in our data, but over 98 percent of these soldiers are also included in that group of individuals who are eliminated because they serve an extended enlistment.

Demographic Characteristics

If we exclude those soldiers identified in the previous discussion, we eliminate 26,681 soldiers and define a final sample of 128,906 individuals. The demographics of this sample are illustrated in Table 3.1. These tabulated data are based on raw counts from the observed sample and do not correct for the presence of censored data. This may explain the smaller number of RC gains from the FY84 cohort. It may also influence the number of four-year-term soldiers observed entering the RC since they have the least amount of time to exercise that option and are more likely to be "censored."

A comparison of Table 3.1 with Table 2.1 reveals how the demographic composition of those leaving at the end of their enlistment terms (Table 3.1) differs from the composition of initial entrants (Table 2.1). These differences reflect differences in first-term attrition and retention behavior of different demographic groups. In comparing the data in this table with the information in Table 2.1, we note several interesting trends. First, whereas the percentage of three-year AC enlistees and losses appears approximately equal, the proportion of two-year enlistees departing the AC is markedly greater than the proportion initially joining the AC. In contrast, the proportion of four-year enlistees departing the AC is much smaller than the proportion observed enlisting in the active component. This is indicative of either a higher rate of attrition or a higher rate of retention among four-year enlistees. In part, this may reflect that two-year enlistees have lower military career aspirations than soldiers who enlist for longer terms of service.

The data also provide evidence of a higher attrition rate among first-term female soldiers. The proportion of females observed both departing the AC and entering the RC is approximately three percentage points lower than the number who enter the AC in each of the cohort year groups. The percentage of black soldiers departing the AC is much lower than the percentage that join the AC, clear evidence of a high retention rate among this group. In fact, the percentage joining the RC more closely approximates the percentage of black soldiers who initially join the AC. This may be evidence of a higher level of satisfaction among minorities for the opportunities offered by the military or it may indicate that

Table 3.1

Demographic Composition of AC Losses and RC Gains
(in percent)

Variable	AC Losses	RC Gains	AC/RC Transition[a]
Overall			35.8
Cohort			
FY82	29.1	35.1	43.1
FY83	35.1	36.7	37.4
FY84	35.8	28.2	28.2
Term of enlistment			
2 year	12.2	16.0	47.0
3 year	56.1	59.7	38.1
4 year	31.7	24.3	27.4
Quality[b]			
High	50.6	47.8	33.7
Low	49.3	52.2	37.9
Sex			
Male	91.0	90.6	35.6
Female	9.0	9.4	37.4
Race/ethnic group			
White, non-Hispanic	75.5	68.4	32.4
Black	17.6	23.6	47.9
Hispanic	6.9	8.0	41.2
Occupational type[c]			
Combat	34.0	33.1	35.0
Noncombat	66.0	66.9	36.3

[a]The transition rate is the number of RC gains for the category divided by the number of AC losses. The transition percentage equals the RC gain percentage (column 3) divided by the AC loss percentage (column 2) times the overall transition percentage, 35.8.

[b]High-quality soldiers are defined as individuals with an AFQT score greater than or equal to 50 and at least a high school diploma.

[c]We use a relatively crude measure to distinguish combat from noncombat occupations based on the first digit of the MOS. Under this criteria, an MOS with a first digit equal to 1 or MOS 21G, 82C or 93F are considered combat occupations. We study this issue in more detail in a later section and impose a more detailed occupational taxonomy.

minorities are more likely to rely on the military for employment and a source of income.

In Table 3.2, we illustrate the relationships between certain soldier characteristics, the length of term of enlistment, and the propensity to join the RC. For each categorical cell, we compute the proportion of eligible soldiers of that type who volunteer for RC duty. That proportion represents the number of RC gains of that type divided by the number of total AC losses of the same type. Quite noticeable is the fact that for each category, the percent of RC gains decreases as the length of the term of enlistment increases.

Table 3.2

Percent of Eligible Soldiers Entering RC by Characteristic and Term

| Characteristic | Term of Enlistment | | |
	Two years	Three years	Four years
Sex			
Male	46.8	37.9	27.2
Female	51.8	39.7	29.2
Quality			
High	46.7	34.8	25.6
Low	49.9	39.9	30.5
Occupation			
Combat	44.5	38.5	27.7
Noncombat	48.8	37.1	27.2
Total	47.0	38.1	27.4

4. Factors Related to Reserve Participation

A key problem in analyzing RC affiliation rates is that some RC accessions may not yet have occurred at the end of the observation period. We know when individuals leave the AC, so we know how many periods individuals are "at risk" of joining the RC. Some of these individuals may never join the RC, but we may find others joined if we observed their behavior for another six months or a year. A so-called "censoring" problem arises because the actual time between AC separation and RC affiliation is censored at the end of the observation period. The censoring issue is particularly important for our analysis of term-of-service effects because individuals with four-year enlistments are at risk to join the RC for a shorter period of time than are two-year enlistees.

This section develops two approaches for dealing with the censoring problem and examining the RC transition rate (Kiefer, 1988). The first approach, known as Kaplan-Meier analysis, is a descriptive technique that corrects for the censoring problem without making any parametric assumption about how the underlying risk or hazard of joining the RC varies over time.[1] The Kaplan-Meier approach allows us to examine the patterns of RC affiliation rates over time for particular subgroups such as different term-of-service groups. A multivariate approach is also used to examine RC affiliation, it can find the net effect of a single characteristic such as age or race/ethnicity while holding constant the effects of other variables that may affect RC affiliation.

Patterns of RC Participation

A useful statistical tool for examining the pattern of RC participation is the Kaplan-Meier estimator. Kaplan-Meier is a nonparametric estimator that considers both the censored data and the uncensored data to determine the survival function. This technique generates estimates of the survival distribution function, S(t), which defines the probability that an experimental unit from the population will have a lifetime exceeding some time t. For our purposes, the survival function measures the probability that a soldier will not have entered the RC at some time t, where t measures the time from ETS.

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[1]The estimates are based on months to join the reserve components or to the censoring point.

If R(j) is the number of soldiers who join the RC during a given time interval and E(j) is the number of soldiers eligible to join during that same period, then

$$A(j) = R(j)/E(j)$$

is the instantaneous accession rate at time j or the hazard function. The probability of "surviving" time period j (i.e., not joining the RC) is given by

$$C(j) = 1 - A(j)$$

and the survival function over time, j = 0 to t − 1, is defined as

$$S(t) = \prod_{j=0}^{t-1} (1 - A(j)).$$

Censored observations are included in the value of E(j) for every time period they are eligible for enlistment in the RC. They are not, however, included in the numerator of the hazard function for the period in which they are censored. Utilizing this technique, we define the cumulative accession function or that proportion of the sample which will join the RC in time t as

$$1 - S(t) \ .$$

The Kaplan-Meier analysis of RC accessions shows that about 40 percent of active Army soldiers who leave at the end of their first term will eventually join the Army reserve components. Most transitions occur immediately after completion of active-duty service, and very few accessions come from individuals who have not joined the RC within three years of AC separation. About 22 percent of soldiers leaving the AC affiliate immediately with a USAR or ARNG unit. Soldiers who do not reenlist in the AC are encouraged by Army inservice counselors to join RC units, and these immediate AC/RC transitions constitute the bulk of all prior-service accessions into the RC. The cumulative accession rate rises to 30 percent by the end of six months and 32 percent by the end of the first year. After the first year, the probability of the remaining nonparticipants joining the RC is sharply reduced. The cumulative affiliation rate has risen to 36 and 39 percent after two and three years, respectively.

Figure 4.1 shows how the pattern of RC participation varies with the individual's AC term of enlistment. The results show that the initial RC participation rate for
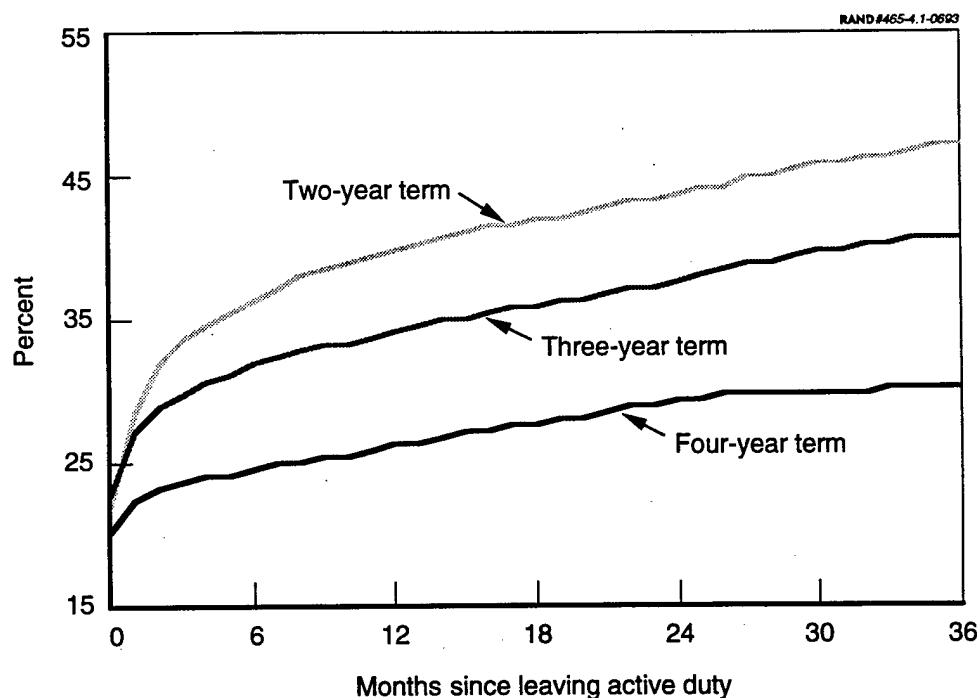
Figure 4.1—Cumulative Reserve Accession Rates by Active-Duty Term of Enlistment (Kaplan-Meier estimates)

four-year enlistees is about 20 percent as compared with 22 and 23 percent for two- and three-year enlistees, respectively. This small gap in accession widens rapidly as greater numbers of prior-service personnel in the two- and three-year groups join the RC. After six months, the cumulative affiliation rate for the two- and three-year groups are 36 and 32 percent, respectively, as compared with only 24 percent in the group of four-year enlistees. The gap continues to grow over time: the participation rate for two-year enlistees reaches 47 percent after three years as compared with 41 percent for three-year enlistees and only 30 percent for four-year enlistees.

The Kaplan-Meier results agree with estimates in Section 3 and show that the soldier's propensity to join the RC varies considerably with AC term of service even after controlling for the effect of censored observations. These large differences in AC participation may reflect several factors. First, individuals with short terms may have greater taste for reserve service than those joining for longer terms. This hypothesis would seem somewhat untenable, because it suggests that individuals with less taste for active-duty service (i.e., they are unwilling to commit for as many years) may have a greater taste for reserve commitment. It may be the case, however, that two-year enlistees have other interests that are complementary with reserve participation. For example,

Schmitz et al. (1989) show that individuals with shorter terms are much more likely to enroll in college or vocational training after leaving the Army than are those with longer terms. We have not examined information on post-service school enrollment, but two-year enlistees may use reserve participation as a means to subsidize their educational training.

An alternative explanation of the term-of-service effect on RC participation is that two-year enlistments are concentrated in occupations and age groups that are otherwise predisposed to join the RC, so the term-of-service effect is confounded with the effects of these other variables. The Kaplan-Meier approach is not well-suited to sorting out these complex effects, but the multivariate approach below will allow us to sort out the net effect of term of service.

The Kaplan-Meier approach is useful for examining the effects of other variables like race/ethnicity and AFQT on reserve accession. Figure 4.2 shows that reserve participation varies substantially with race/ethnic group even after adjusting for censoring of participation times. The initial transition rate into the reserve is 6 and 11 percentage points higher for Hispanics and blacks, respectively, than for whites. After three years, 51 percent of blacks have joined a reserve unit as
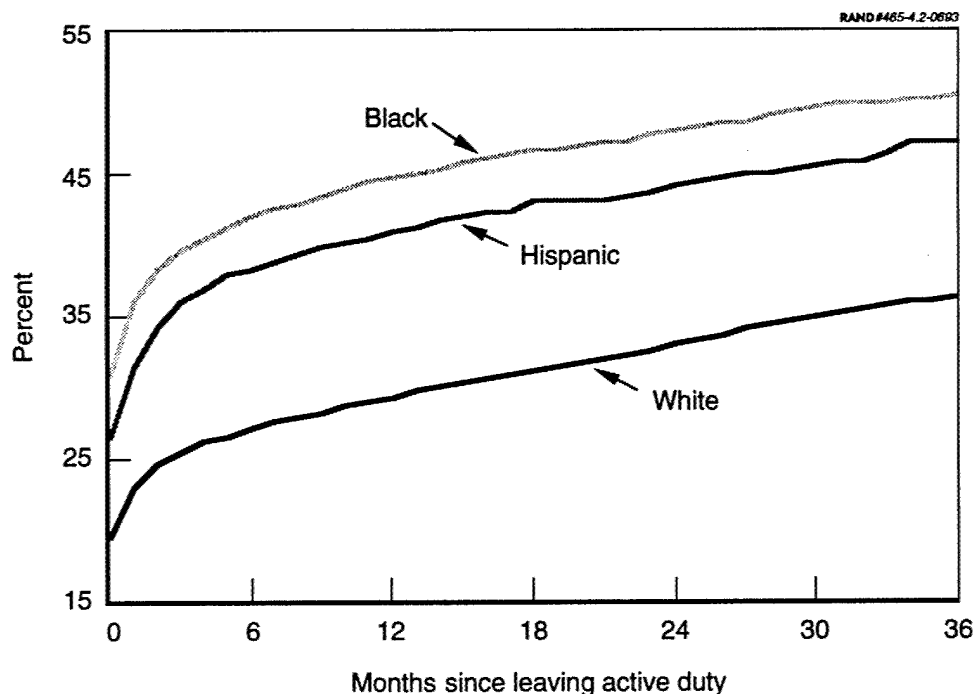

Figure 4.2—Cumulative Reserve Accession Rates by Race/Ethnic Group
(Kaplan-Meier estimates)

compared with 35 percent of whites. The cumulative accession rate for Hispanics is 46 percent at the three-year point.

The higher affiliation rate for blacks is consistent with an earlier finding by Marquis and Kirby (1989), although that study did not include information on Hispanic status. Studies of first-term attrition and retention show that these minority groups have greater attachment to the military than do white non-Hispanics (Buddin, 1988; Buddin et al., 1992). These differences may reflect differences in tastes for military service in both the active and reserve components. Alternatively, these groups may perceive relatively less discrimination in the military and have greater participation rates as a result.

Figure 4.3 shows how the cumulative reserve accession rate varies by aptitude category. For the most part, these changes are modest, but the lower aptitude groups tend to have higher reserve participation rates. About 26 percent of the Category IV group join the RC immediately as compared with 18 and 20 percent of the Category I and II groups, respectively. After three years, nearly half of the lowest aptitude group have joined the RC as compared with about a third of the highest aptitude group.

The Kaplan-Meier analysis of other variables indicated much more modest differences in reserve participation across subgroups. Cumulative reserve accession rates varied little by gender and education group. We also found little difference in participation patterns by a very broad occupational grouping (combat versus noncombat), but we will examine occupation effects more completely in the multivariate analysis. Accession patterns differ markedly for high-quality versus low-quality recruits, where a high-quality recruit is defined as a soldier who is a high school diploma graduate and in AFQT Categories I, II, or IIIa. The quality differences simply mirror the patterns shown in Figure 4.3, however, since reserve participation differed little by educational group.

The Kaplan-Meier analysis confirms the earlier evidence that reserve accession rates are much larger for two-year enlistees than for three- and particularly for four-year enlistees. The censored data problem was not giving us a false impression of higher participation rates among those with shorter terms of service. The results also show that the hazard rate for joining the RC is highest for all groups in the period of direct transition from the AC into the RC. The probability per unit time of an individual joining the RC declines rapidly during the first several months after leaving the AC, with few individuals ever joining the RC after a gap of three years. The results also indicated substantial

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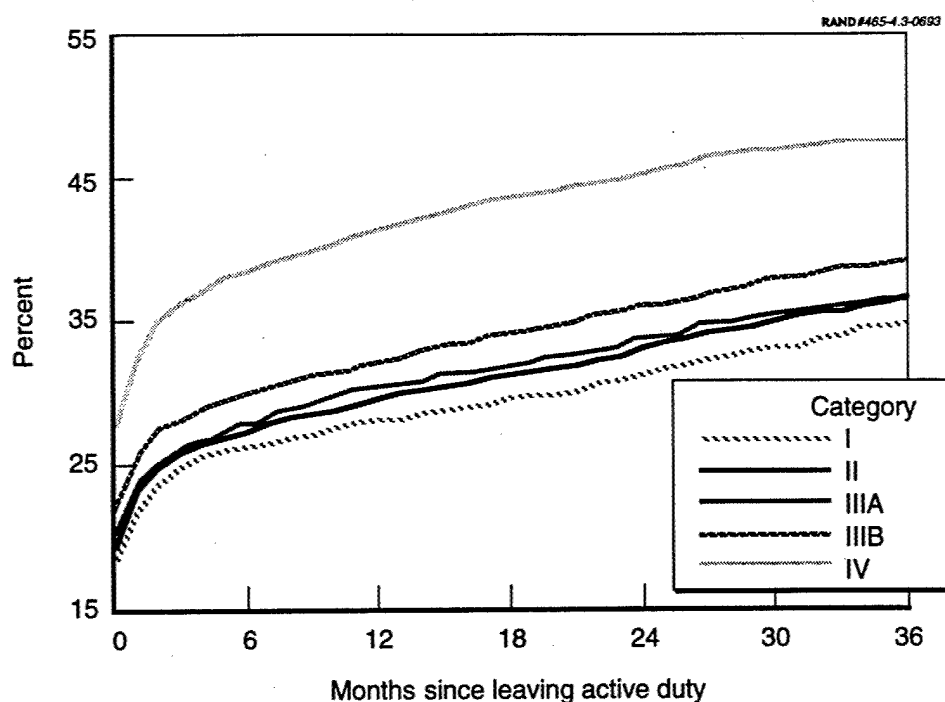
Figure 4.3—Cumulative Reserve Accession Rates by AFQT Category
(Kaplan-Meier estimates)

differences in affiliation rates by race/ethnicity and aptitude groups, with small
differences for other individual characteristics.

Multivariate Analysis of RC Accessions

A Cox proportional hazards model was estimated to separate the effects of
interrelated individual characteristics. The method divides the underlying
hazard into two parts: the first is a baseline hazard, and the second is a function
of individual characteristics. Let the instantaneous hazard (accession) function
equal

$$h(t) = h_0(t) \quad \exp(\beta_0 + \beta_1 \, x_1 + \ldots + \beta_k x_k)$$

where $h_0(t)$ is a common baseline hazard function that applies to all soldiers; β_0,
$\beta_1, \ldots, \beta_k$ are a set of shift parameters that move $h(t)$ upward or downward in all
periods; and t is the number of months since leaving the AC. The model is
proportional in the sense that the effect of a particular variable like gender is
assumed to shift the hazard in a proportional manner across all time periods. For

example, if men were 5 percent more likely to affiliate with the reserves than women, the proportional hazard formulation would restrict the predicted effect to be 5 percent higher in the first month after leaving the AC and for each successive month as well. The advantage of the proportional hazard formulation over the Kaplan-Meier approach is the ability to hold constant a large number of factors.[2] A potential weakness of the formulation is the possibility that the relative effects of some variables might change over time. The earlier life-cycle analysis provides evidence that the data are not at odds with the proportionality assumption.

An advantage of the Cox formulation of the proportional hazard model is that the formulation requires no parametric specification of the underlying hazard function $h_0(t)$. We are not concerned about the nature of the basic underlying hazard relation, but rather in how particular individual characteristics affect the probability of joining a reserve unit.

A useful way of interpreting the effect of a variable on the probability of joining the RC is to consider the effect of a change in the variable on the relative risk of participation. Relative risk is defined as $h(t)/h_0(t)$, and the natural log of relative risk equals the combination $\beta_0 + \beta_1 X_1 + \ldots + \beta_k X_k$. Now suppose that we want to compare the relative risk of a man and a woman joining the RC and that the individuals were similar in other respects. Let X_1 be an indicator variable that equals 1 for a man and 0 for a woman; then the relative hazard for the man relative to the woman is

$$\exp\left(\beta_0 + \beta_1 + \ldots + \beta_k x_k\right)/\exp\left(\beta_0 + \ldots + \beta_k x_k\right) = \exp\left(\beta_1\right) .$$

If the baseline hazard for a woman is $h_0(t)$, then the baseline hazard for a man is $h_0(t) \times \exp(\beta_1)$. For continuous variables, the relative hazard factor shows how a one unit increase in the X variable affects the reserve accession rate.

Table 4.1 shows the Cox regression results for RC affiliation.[3] The table records both the regression coefficients and the relative hazard factors described above. For the most part, the regression variables correspond to those discussed earlier, but the analysis controls for a set of factors simultaneously. Several new factors

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[2] Our approach controls for the main or first-order effects of the independent variables. We were unable to systematically test whether higher order interactions were significant in the hazard specification, because the methods for testing such interactions are not as well developed as in standard linear regression analysis.

[3] The model was estimated on a 20 percent sample of those departing AC soldiers who were eligible for the RC.

have been added to the model, however, because we anticipated that they might confound the effects of other factors. First, age at accession was added, since the lower accession rates among four-year enlistees might simply reflect the fact that these individuals are older than two-year enlistees and fewer will participate in the RC for some age-related reason. Second, the analysis adds variables that adjust for the economic opportunities that an individual faces when deciding whether to join the RC. The economic variables are the unemployment rate in the individual's home state at the time of AC separation and the youth wage rate for comparable individuals by race/ethnicity, age, and educational level (Hosek et al., 1992). RC participation should be higher if the local unemployment is higher or the wage is lower.[4]

The multivariate results in Table 4.1 show that two-year enlistees have substantially higher RC participation rates than four-year enlistees. The relative hazard column of the table shows that the RC accession rate is 62 and 14 percent higher for two- and three-year enlistees than for the four-year base group. The results suggest that if the cumulative three-year RC participation rate for four-year enlistees was 30 percent, then otherwise comparable two- and three-year enlistees would have participation rates of 49 and 34 percent, respectively. The Kaplan-Meier results in Figure 4.1 suggested a comparable gap between the accession rates for two- and four-year enlistees, but the multivariate approach substantially reduced the gap between three- and four-year enlistees. Apparently, three-year enlistees have individual characteristics and skill assignments that make them somewhat more predisposed toward joining the RC, so the apparent differences in participation rates between three- and four-year enlistees are reduced when the factors are held constant. Two-year enlistees are much more likely to participate in the RC, even after controlling for a variety of other factors in the statistical model.

Race/ethnic group differences in RC participation rates are also large. Blacks and Hispanics are 44 and 26 percent more likely, respectively, to participate in the RC than their white non-Hispanic counterparts. These ratios correspond closely with those in the Kaplan-Meier analysis of Figure 4.2.

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[4]Unfortunately, ideal economic variables were not available for this analysis. The "best guess" is that individuals return to their home state after completing their active-duty assignment, but this issue has not been analyzed. Also, unemployment rates may vary considerably within a state, so the statewide average may be a poor indication of local rates. The wage information is national and not broken down by location. Wage estimates were available for states and metropolitan areas, but these estimates did not separate youth wages from wages of the general working population.

Table 4.1

**Parameter Estimates for Cox Regression on Time to Army RC Accession
from the FY82 Through FY84 Active-Duty Cohorts**

Variable	β Coefficient	Standard Error	Relative Hazard
Age at active duty accession			
17	0.045	0.043	1.046
19	–0.045	0.032	0.956
20	–0.047	0.042	0.954
21	–0.113*	0.050	0.893
22	–0.122*	0.057	0.885
23 or older	–0.183*	0.063	0.833
Ethnic group			
Black	0.364*	0.033	1.439
Hispanic	0.234*	0.055	1.264
Education level			
Non-high school graduate	0.008	0.054	1.008
Certificate of general educational development	0.080	0.073	1.083
Some post-high school	–0.003	0.044	0.997
AFQT category at accession			
Category II	0.008	0.050	1.008
Category IIIa	–0.024	0.053	0.977
Category IIIb	0.050	0.053	1.051
Category IV	0.267*	0.057	1.306
Active-duty occupation			
Electronic Equipment	–0.269*	0.064	0.764
Communications/ intelligence	0.014	0.034	1.015
Medical/dental	0.304*	0.050	1.356
Other technical/allied	0.042	0.077	1.043
Functional support/ administration	0.215*	0.036	1.240
Electrical/mechanical	–0.017	0.034	0.983
Craftsmen	–0.266*	0.096	0.767
Service/supply handlers	0.012	0.033	1.012
Male	0.064	0.040	1.067
Term of enlistment			
2 years	0.486*	0.038	1.627
3 years	0.130*	0.029	1.139
Unemployment rate	0.014*	0.005	1.015
Civilian wage rate	–0.016	0.016	0.984
Number of observations	25,826		
Ln likelihood	–91850.800		

NOTE: The omitted reference categories are as follows: age 18, white non-Hispanic, high school graduate, Category I, combat, female, and 4-year enlistment. Starred entries are significant at the a = 0.05 confidence level.

RC participation rates differ little across most AFQT categories, but the Category IV group does have a participation rate about 32 percent higher than the other groups. The higher participation rate of the low-aptitude group may indicate that this group has relatively worse civilian prospects than others. Alternatively, this group may have greater taste for the military or part-time employment.

The pattern of age effects in Table 4.1 is interesting. RC participation rates fall monotonically with individual age at AC accession. Rates are 11, 12, and 17 percent lower for the 21-, 22-, and 23-year-old or greater group than for 18-year-old active-duty recruits. In our data, about 25 percent of all active-duty recruits were more than 20 years old. These older recruits may have different plans for returning to the civilian sector at the completion of the active-duty tour. For example, older individuals may be less likely to return to school and more likely to have family obligations than the younger individuals. These life-cycle differences may explain the differences in RC participation behavior.

The multivariate results show no significant differences in RC participation behavior by educational level. This finding is somewhat surprising since Marquis and Kirby (1989) found a higher participation rate for nongraduates than for recruits with a high school diploma or some post-high school education.

RC participation rates differ substantially by occupational group. Individuals with active-duty training in the medical/dental and functional support/ administration areas have participation rates 36 and 24 percent higher than in the combat area. Participation rates are unusually low in two areas: the electronic equipment repair and craftsmen areas have participation rates about 25 percent lower than those in combat. These differences may reflect differences in the civilian opportunities available to individuals with these skills or perceived differences in the value of reserve participation. For example, medical personnel may participate in the reserves in larger numbers because they envision the military training and educational support as complementing their career objectives. In contrast, combat soldiers will have less direct transferability of their military training to the civilian sector and less overlap between their civilian occupation and their reserve job.

Alternatively, the occupational effects of Table 4.1 may reflect differences in RC demand for soldiers with training in different areas. The AC force structure differs somewhat from the RC force structure, so the RC might be unable to accept all available prior-service personnel in the active-duty skills. For example, Table 4.2 shows that the AC is more combat intensive than the reserve, so some combat soldiers might be demand constrained from joining the RC in their

Table 4.2

Force Structure Imbalances Between the AC and RC

DoD Occupational Area	Percent of AC Losses	Percent of RC Positions	Ratio of AC Supply to RC Demand
Infantry, gun crew	29.5	23.8	1.2
Electronic equipment	4.5	1.9	2.4
Communications/intelligence	15.3	8.4	1.8
Medical/dental	4.8	6.7	0.7
Other technical/allied	2.1	2.5	0.8
Functional support/ administration	11.4	17.0	0.7
Electrical/mechanical	15.5	14.9	1.0
Craftsmen	1.9	4.4	0.4
Service/supply handlers	15.0	13.3	1.1

active-duty skill. The skill composition of the AC and RC forces differs for other occupational areas. No simple interpretation of these demand constraints will explain the pattern of RC participation rates by occupational area. RC participation rates are low for the craftsmen area, where the force structure situation shows that these skills are in short supply for the RC. On the other hand, participation rates are high in the medical/dental and functional support/administration areas, which are disproportionately concentrated in the RC. Local imbalances between the skills of returning soldiers and RC vacancies in an area may also create local demand constraints. Further analysis of RC demand is required to sort out the effects that these demand restrictions may have on reserve participation rates.

The multivariate results in Table 4.1 show that males have reserve participation rates about 7 percent higher than females after controlling for other factors in the model. This difference is statistically insignificant, however, and the size of the difference is modest. If the three-year cumulative RC accession rate were 39 percent for men, then the rate for women with comparable characteristics is predicted as about 36 percent.

The economic variables have the expected qualitative effects on RC participation, but the magnitude of the effect is small. A 1 percent increase in unemployment is associated with a 1 percent increase in RC participation. A one dollar per hour increase in real wages is associated with about a 2 percent decline in RC participation (the coefficient associated with civilian wage is not significantly different from zero).

5. Conclusions

The analysis shows that about 40 percent of the Army's first-term soldiers who do not reenlist at the end of their first term join the Army's reserve components. About a fifth of each exit cohort make an immediate commitment to join a reserve unit before returning home. Individuals with an interest in the RC are likely to join the RC quickly after leaving the AC. The cumulative reserve affiliation rate is 30 percent after six months and 32 percent after one year. The risk or hazard of joining continues to decline thereafter, but some prior-service soldiers are still joining RC units two and three years after leaving the AC. The cumulative reserve affiliation rate is 36 percent after two years and 39 percent after three years.

The study uses two statistical approaches to examine reserve participation rates. Both approaches are designed to adjust for a censored data problem that occurs because some of the individuals in our database have been "at risk" to join the RC for a longer period than have others. A Kaplan-Meier approach is used to describe broad patterns in the timing of RC participation after separating from the AC. A Cox proportional hazards model is also estimated to simultaneously sort out the effects of a variety of individual characteristics and occupational factors on RC participation.

The results show that RC participation varies substantially by AC term of enlistment. Initial tabular analysis and Kaplan-Meier results showed that four-year enlistees had much lower participation rates than three- and two-year enlistees. The more refined multivariate estimates showed that the differences in participation rates between three- and four-year enlistees are modest after controlling for other factors, but two-year enlistees have much higher participation rates than the other groups. Other things equal, the RC participation rate for two-, three-, and four-year enlistees are predicted to be 49, 34, and 30 percent, respectively. This large effect of shorter term on RC manning persists even after controlling for individual age, aptitude, and occupational training. The finding suggests that shorter terms might ease RC manning problems by cycling people quickly through the AC, because these recruits are more disposed to joining the RC.

The study also found substantial differences in RC participation by race/ethnicity, aptitude, and age group. Other things equal, blacks and

Hispanics are 44 and 26 percent more likely to participate in the RC than white non-Hispanics. Individuals in AFQT Category IV are much more likely to join the reserve than their counterparts in higher aptitude groups. The race/ethnicity and aptitude effects may reflect either limited civilian employment opportunities for minorities and for persons with lower aptitude scores, or a greater taste of these groups for RC service. RC participation declined monotonically with recruit age at active-duty accession, and the predicted RC affiliation rate for a 23-year-old was about 7 percentage points lower than for a comparable 18-year-old. These age differences in participation probably reflect different life-cycle behaviors where younger individuals have fewer family responsibilities to conflict with reserve participation. Also, we suspect that school enrollment declines rapidly with age and that reserve participation is more complementary with school enrollment than with full-time employment.

RC participation differs markedly by occupational group, but these differences probably reflect a combination of supply and demand factors. Some areas, such as combat and communications/intelligence, are disproportionately concentrated in the AC, whereas other areas, such as medical/dental, functional support/administration, and craftsmen, are disproportionately concentrated in the RC. Reserve units should prefer prior-service personnel trained in skills needed by the unit, but it is unclear whether mismatched prior-service personnel were discouraged from joining the RC. Also, some individuals may prefer to retrain out of their active-duty skill and affiliate only if reassignment is available.

Several factors have small effects on RC participation. Affiliation does not differ by educational level and is only about 3 percentage points higher for males than for females. Higher wage rates and lower unemployment rates discourage reserve participation, but the economic variables have a weak effect on RC participation.

Finally, the high affiliation rate of two-year enlistees suggests that the 2+2+4 program should provide a substantial benefit to the RC. The 2+2+4 program makes reserve participation a condition for the receipt of Army College Funds, so the affiliation rate of program participants should be even higher than for other two-year enlistees. Future analysis of the 2+2+4 cohort will provide an opportunity to identify whether post-service school enrollment is the pivotal factor in the higher affiliation rates of individuals with short tours.

Appendix

Active-Duty Losses and Reserve Component Gains

Table A.1

**Reserve Component Gains from the FY82 Cohort by Active Component
Separation Category**

Status/Reason for Leaving	ISC[a]	AC Losses	RC Gains
Still on active duty	0	23050	1984
ETS	1	44902	17729
Early Release—Insufficient Retainability	2	126	50
Early release to attend school	3	0	0
Early release—other (RIF)	8	1952	453
Medical condition existing prior to service	10	375	13
Disability—severance pay	11	1331	45
Permanent disability—retired	12	273	6
Temporary disability—retired	13	880	18
Disability—no severance pay	14	185	2
Unqualified for active duty—other	16	3342	72
Failure to meet body fat standards	17	430	24
Dependency or hardship	22	1194	267
Nonbattle death	32	370	6
Officer commissioning program	40	1329	107
Service academy	42	75	4
20–30 years of service	50	8	0
Character or behavior disorder	60	654	19
Motivational problems	61	190	5
Alcoholism	64	1442	25
Discreditable incidents	65	30	4
Drugs	67	3376	62
Civil court conviction	71	190	0
Court-martial	73	838	12
Fraudulent entry	74	785	19
Homosexuality	76	315	0
Good of the service	78	3998	50
Misconduct	80	1255	35
Unsuitability	82	621	9
Pattern of minor discipline infractions	83	144	8
Commission of a serious offense	84	629	20
Failure to meet retention standards	85	1232	62
Expeditious discharge	86	9151	339
Trainee discharge	87	10389	197
Secretarial authority	90	133	35
Erroneous enlistment	91	71	10
Sole surviving family member	92	1	1
Pregnancy	94	1704	400
Parenthood	97	628	149
Breach of contract	98	173	16
Other	99	44	1
Immediate reenlistment	100	19	0
Dropped for desertion	101	119	12
Dropped for imprisonment	102	99	5
Record correction—other	103/105	32	7

[a]ISC is Interservice Separation Code.

Table A.2

Reserve Component Gains from the FY83 Cohort by Active Component
Separation Category

Status/Reason for Leaving	ISC Code	AC Losses	RC Gains
Still on active duty	0	24961	1855
ETS	1	44301	16389
Early release—insufficient retainability	2	198	71
Early release to attend school	3	2	1
Early release—other (RIF)	8	10160	2321
Medical condition existing prior to service	10	405	9
Disability—severance pay	11	1639	44
Permanent disability—retired	12	256	2
Temporary disability—retired	13	954	21
Disability—no severance pay	14	244	2
Unqualified for active duty—other	16	4423	62
Failure to meet body fat standards	17	492	33
Dependency or hardship	22	1297	224
Nonbattle death	32	398	3
Officer commissioning program	40	1512	127
Service academy	42	78	2
20–30 years of service	50	9	2
Character or behavior disorder	60	851	37
Motivational problems	61	0	0
Alcoholism	64	1288	26
Discreditable incidents	65	12	0
Drugs	67	3606	53
Civil court conviction	71	169	3
Court-martial	73	1092	23
Fraudulent entry	74	771	15
Homosexuality	76	340	7
Good of the service	78	3709	69
Misconduct	80	1606	39
Unsuitability	82	187	4
Pattern of minor discipline infractions	83	142	6
Commission of a serious offense	84	958	33
Failure to meet retention standards	85	1886	60
Expeditious discharge	86	6737	217
Trainee discharge	87	13094	203
Secretarial authority	90	170	36
Erroneous enlistment	91	233	9
Sole surviving family member	92	1	0
Pregnancy	94	1767	434
Parenthood	97	660	127
Breach of contract	98	142	22
Other	99	62	3
Immediate reenlistment	100	951	40
Dropped for desertion	101	152	16
Dropped for imprisonment	102	132	3
Record correction—other	103/105	31	8

Table A.3

Reserve Component Gains from the FY84 Cohort by Active Component Separation Category

Status/Reason for Leaving	ISC Code	AC Losses	RC Gains
Still on active duty	0	28624	1539
ETS	1	31764	8292
Early release—insufficient retainability	2	181	47
Early release to attend school	3	0	0
Early release—other (RIF)	8	22189	5917
Medical condition existing prior to service	10	394	7
Disability—severance pay	11	1733	14
Permanent disability—retired	12	181	1
Temporary disability—retired	13	1000	12
Disability—no severance pay	14	259	6
Unqualified for active duty—other	16	4703	62
Failure to meet body fat standards	17	719	27
Dependency or hardship	22	1300	199
Nonbattle death	32	417	5
Officer commissioning program	40	1417	155
Service academy	42	78	2
20–30 years of service	50	17	2
Character or behavior disorder	60	1052	24
Motivational problems	61	0	0
Alcoholism	64	1075	14
Discreditable incidents	65	8	0
Drugs	67	4019	25
Civil court conviction	71	152	1
Court-martial	73	1148	10
Fraudulent entry	74	522	14
Homosexuality	76	366	2
Good of the service	78	3607	40
Misconduct	80	2105	22
Unsuitability	82	51	2
Pattern of minor discipline infractions	83	164	4
Commission of a serious offense	84	1140	22
Failure to meet retention standards	85	2301	47
Expeditious discharge	86	5122	135
Trainee discharge	87	10660	166
Secretarial authority	90	187	29
Erroneous enlistment	91	217	9
Sole surviving family member	92	4	0
Pregnancy	94	1796	355
Parenthood	97	593	83
Breach of contract	98	147	32
Other	99	62	2
Immediate reenlistment	100	19	0
Dropped for desertion	101	217	4
Dropped for imprisonment	102	116	4
Record correction—other	103/105	42	6

Table A.4

Summary of Reserve Component Gains and Active Component Separations for the FY82 Through FY84 Cohorts

Status/Reason for Leaving	AC Losses	RC Gains
FY82 cohort		
Early releases & ETS	46980	18232
"Other" discharges	47679	2050
Total	118084	22280
FY83 cohort		
Early releases & ETS	54661	18782
"Other" discharges	52051	2014
Total	132078	29347
FY84 cohort		
Early releases & ETS	54134	14256
"Other" discharges	48716	1537
Total	131868	17339

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